



Aeronautics Research Mission Directorate

Improving aviation safety and efficiency

The first “A” in “NASA” stands for “Aeronautics”—as in the “National Aeronautics and Space Administration.”

Aeronautics has been part of NASA for more than 50 years. Before that, the National Advisory Committee for Aeronautics conducted pioneering research that influenced the design of every U.S. aircraft. NASA integrated that knowledge and existing testing facilities when it was created in 1958.

The Aeronautics Research Mission Directorate, located at NASA’s Headquarters in Washington, DC, oversees the agency’s aeronautics research, which is conducted primarily at four NASA centers:

- Ames Research Center
Moffett Field, Calif.
- Dryden Flight Research Center
Edwards, Calif.
- Glenn Research Center
Cleveland
- Langley Research Center
Hampton, Va.

RESEARCH GOALS

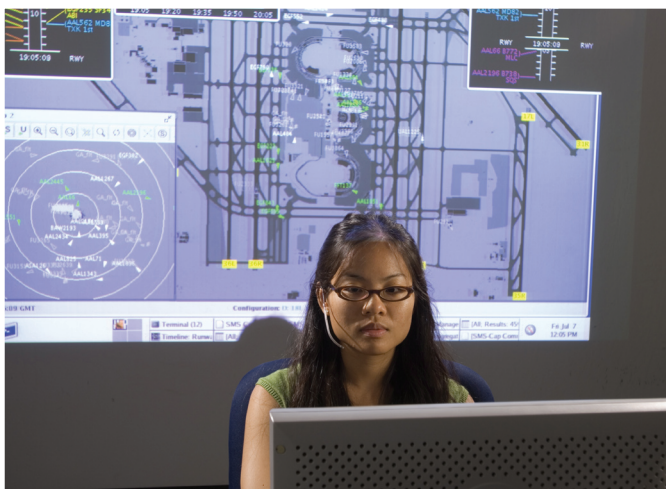
NASA’s aeronautics activities are organized into three research programs and one test facilities management program:

- Aeronautics Test Program
- Airspace Systems Program
- Aviation Safety Program
- Fundamental Aeronautics Program

NASAfacts



A view from a NASA chase plane during a test flight of the blended wing body X-48B remote-piloted vehicle in April 2008. *Image credit: NASA Dryden/Lori Losey*



Researcher Jane Thipphavong uses NASA's Surface Management System to analyze airport ground traffic. *Image credit: NASA Ames*

Each program emphasizes research through collaboration and partnerships, shared ideas and knowledge, and solutions that benefit the public.

NASA works to improve aviation safety and efficiency. Nearly every aircraft today includes a technology developed from research conducted by NASA or from tests done in a NASA facility.

As demands on the aviation transportation system grow, NASA's aeronautics research goals include improving air traffic and aviation safety, and reducing fuel consumption, noise and emissions.

AERONAUTICS PROGRAMS

Aeronautics Test Program

The Aeronautics Test Program ensures the availability and accessibility of an extensive suite of ground and flight testing facilities for aeronautics research including laboratories, wind tunnels, flight test beds and other aerospace assessment capabilities. NASA researchers, other government agencies, corporations and institutions use the program's facilities to test new solutions for everything from jet engine noise reduction to aircraft icing detection.

Airspace Systems Program

The Airspace Systems Program works to transform the national air transportation system to accommodate dramatic increases in capacity, efficiency and flexibility. Its research is critical to development of the Next Generation Air Transportation System, which will allow for safe and efficient travel through increasingly crowded skies.



NASA researchers prepare a remotely-piloted scale vehicle for a test flight of synthetic vision systems. *Image Credit: NASA*

Aviation Safety Program

The Aviation Safety Program focuses on developing cutting-edge technologies and capabilities to improve the safety of the Next Generation Air Transportation System. Its research activities address the particular challenge of increasing safety while also improving efficiency.

Fundamental Aeronautics Program

The Fundamental Aeronautics Program focuses on making possible radical new designs for vehicles that fly at all speeds from subsonic to hypersonic. Its researchers explore ways to make potential future versions of subsonic and supersonic vehicles operate more cleanly, quietly and efficiently.

PARTNERSHIPS

NASA partners with others to enhance the state of U.S. aeronautics, including major U.S. aircraft and engine manufacturers, U.S. government agencies, universities, non-government organizations, and international partners where the research and cooperation is of mutual benefit to both nations.

The Aeronautics Research Mission Directorate uses a variety of processes to create formal and informal partnerships including: Cooperative or Reimbursable Space Act Agreements, NASA Research Announcements, Announcements of Opportunity, Technical Working Groups or Technical Interchange Meetings.

These are just a few examples of the many partnerships currently underway:



Test engineer Mark D 'Aprile checks a small model of a supersonic jet concept designed by Gulfstream Aerospace and tested in a NASA wind tunnel. *Image credit: NASA Langley/Sean Smith*

Industry—working with NASA to:

- develop computer codes to help detect the accretion of ice on aircraft;
- develop small commercial efficient and quiet air transportation to be introduced during the time period 2030-2035; and
- test noise reduction techniques to someday allow supersonic vehicles to make transcontinental flights.

International Partners—working with NASA to:

- investigate causes of, and solutions to reduce, aircraft airframe noise;
- research in-flight aircraft icing and improve in-situ and remote sensing of the environment; and
- design, fabricate, test and validate foil gas bearings that could be used in oil-free turbomachinery.

Universities—working with NASA to:

- develop multi-scale tools for airspace modeling and design;
- develop smart sensor processing for automatic runway hazard detection; and
- design and test an integrated alerting and notification function for the future intelligent integrated flight deck.

U.S. Government Agencies—working with NASA to:

- pursue complementary goals in aviation and space transportation safety, airspace system efficiency, environmental compatibility and international leadership and others;
- transform the U.S. air transportation system into the Next Generation Air Transportation System by the year 2025; and
- conduct research that enables revolutionary capabilities in rotorcraft.



Jon Montgomery (right) of NASA's Aeronautics Mission Support Office and his son Jack view a NASA blended wing body test model that is now at the Smithsonian's National Air and Space Museum. *Image credit: NASA/Maria Werries*

NATIONAL AERONAUTICS RESEARCH AND DEVELOPMENT POLICY

In December 2006, the president of the United States established the first National Aeronautics Research & Development Policy to advance U.S. technological leadership in aeronautics. The goal is to create a vibrant, dynamic research and development community that includes government, industry and academia.

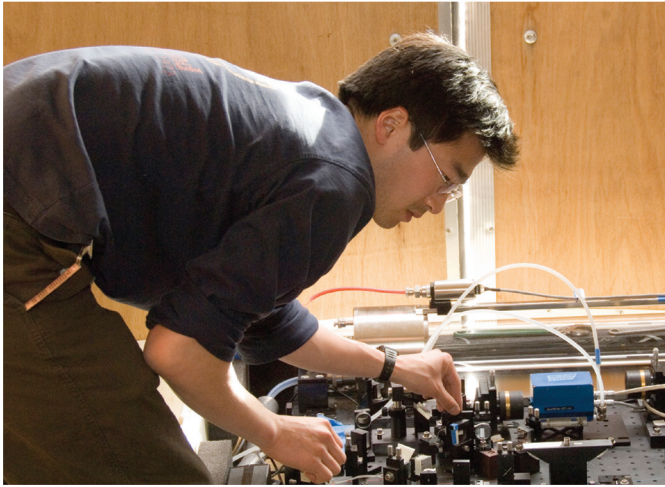
NASA contributed to the development of the policy, its follow-on Research and Development Plan in 2007 and the Research and Development Plan Technical Appendix in 2008. NASA's aeronautics research goals are fully aligned with these guiding documents and their key principles: focus on cutting-edge research with broad benefits, share research results as widely as possible, coordinate the management of U.S. aeronautics infrastructure across federal departments and agencies, and establish strong partnerships.

FUTURE WORKFORCE

NASA's Aeronautics Research Mission Directorate seeks to engage and inspire students of all ages through educational materials, design competitions for high school and college students, exhibits, and more. In particular, NASA provides programs to create a future workforce by helping students pursue careers in aeronautics- and aerospace-related fields.

Aeronautics Scholarship Program

This new program awards scholarships to highly motivated undergraduate and graduate students who are pursuing careers in aeronautics and related fields.



Harvard graduate student Ben Lee tunes the optics on a quantum-cascade-laser methane isotope sensor used for alternative jet fuel testing. *Image credit: NASA Dryden/Tom Tschida*

Undergraduates in their second year of study can earn up to \$15,000 per year for two years, and graduate students can earn up to \$35,000 per year for three years. Money can be used for tuition, room and board, and other school-related expenses. Students also can apply for optional summer internships at NASA research centers to earn an additional \$10,000 in stipends. All applicants must be U.S. citizens.

Twenty undergraduate and five graduate scholarships were awarded in fall 2008 for the first scholarship year.

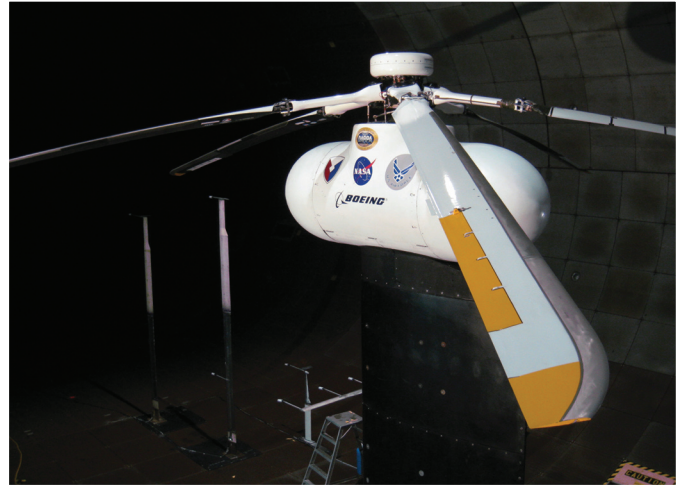
For more information about NASA's aeronautics research activities, establishing a partnership or applying for a scholarship, visit **www.aeronautics.nasa.gov**.

National Aeronautics and Space Administration

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www.nasa.gov



Tests in a NASA wind tunnel of this SMART rotor hub confirm the ability of advanced helicopter-blade active control strategies to reduce vibrations and noise. *Image Credit: NASA*

BY THE NUMBERS

- Annual budget, NASA: \$17.8 billion*
- Annual budget, NASA Aeronautics: \$446.5 million*
- Workforce, NASA: 18,625 full-time civil service employees**
- Workforce, NASA Aeronautics: approximately 1,395 full-time civil service employees**
- NASA Research Announcement Awards, NASA Aeronautics: 377**
- International Partnerships, NASA Aeronautics: 17 (countries represented include Australia, Canada, France, Germany, Italy, Japan, Korea, Spain, United Kingdom)**

* Fiscal year 2009, U.S. dollars.

** As of March 2009.